CHAPTER 6

VETERINARY SUPPORT IN A NUCLEAR, BIOLOGICAL, AND CHEMICAL ENVIRONMENT

Section I. SUBSISTENCE

6-1. Subsistence Stocks

a. At the beginning of a conflict in an established AO, military personnel are fed from subsistence stocks on hand. These stocks may consist of—

- Operational rations (A Rations, B Rations, and Medical B Rations).
- Other subsistence on hand from sources such as the commissary or the Army and Air Force Exchange Service.

b. Operational rations (A Rations, B Rations, and Medical B Rations) are located within units as part of their prescribed unit loads or within the established supply system, either in transit or in storage. The majority of the subsistence items in the supply system are located at direct support (DS) or general support (GS) Class I supply points.

c. When a new AO is being established, units bring their subsistence into the new theater as part of the prescribed unit load. These subsistence items consist primarily of operational rations. Initially, these rations will be consumed in the theater, especially during the early stages of the conflict. It is expected, however, that A Rations and B Rations will be introduced when the AO can support the additional logistical requirements. Medical B Rations are required when hospitals are established and receiving patients.

6-2. Concept of Operations

The availability of contamination-free subsistence items in an AO depends upon the amount of planning taken for the protection of subsistence prior to the initiation of NBC warfare.

a. The procedures to protect subsistence items from an NBC threat must become a part of OPLANs and TSOPs maintained by all units. Each unit incorporates procedures into its readiness plan for the protective storage of subsistence items. Procedures for monitoring the results of decontamination of subsistence items are incorporated into the unit SOPs.

b. Prior to and after initiation of NBC warfare, command and technical (medical) channels of communication are used to disseminate information pertaining to the use of NBC-contaminated/exposed subsistence. Veterinary personnel provide information and guidance to unit commanders regarding the storage, protection, decontamination, and use of NBC-contaminated subsistence.

6-3. Veterinary Support

Veterinary personnel support commanders in developing readiness plans and SOPs for the protection, decontamination, and use of subsistence items in the NBC environment. This assistance is either in the form of direct or indirect veterinary support.

a. Direct veterinary support is provided to commanders by assignment of veterinary teams/ personnel at GS and DS Class I activities. This support is in the form of technical advice to aid the commander in formulating plans and procedures pertaining to the storage, decontamination, and use of subsistence which may become exposed to an NBC agent. See Appendix I for information on future veterinary support and new veterinary units developed as a result of the Medical Reengineering Initiative (MRI).

b. Indirect veterinary support is provided to unit commanders by disseminating (through command/technical channels) information and guidance pertaining to NBC contamination of subsistence.

c. Veterinary personnel inspect at unit level on an area support basis, as required.

6-4. Veterinary Plans and Procedures

a. *Procedures*. The commander of veterinary units/teams develops readiness plans and SOPs required of the veterinary unit in an NBC environment (see Appendix B for a sample of a format for the veterinary support portion of the CHS plan). Plans and SOPs include procedures for—

- Protecting veterinary personnel in the NBC environment.
- Training veterinary personnel to function in the NBC environment (see Appendix H for information on training).
- Monitoring the protection of subsistence in the NBC environment.
- Maintaining assigned NBC equipment.
- Inspecting subsistence in the NBC environment.
- Monitoring the decontamination of NBC-contaminated subsistence.
- Treating MWDs and other government-owned animals that become NBC casualties.
- Reporting intelligence data through command channels.
- Ensuring the security of veterinary equipment, supplies, and personnel.
- Using veterinary personnel to support assigned NBC mission.

b. Mission-Oriented Protective Posture (MOPP). Upon receipt of an NBC warning, veterinary leaders place readiness plans into operation and direct veterinary personnel to assume the appropriate MOPP level. After assumption of the directed MOPP level, veterinary personnel, within limits dictated by the tactical situation, ensure that actions are taken to protect subsistence items.

c. Corrective Action. If subsistence items have not been protected in accordance with protection plans and procedures, or if the plans/procedures need modification, a recommendation for corrective action is initiated by veterinary personnel.

6-5. Actions During the Attack

During an NBC attack, veterinary personnel remain in MOPP 4. Individual decontamination and first aid procedures are performed, as required. Veterinary personnel also perform unit NBC-monitoring tasks and report NBC information, as required.

6-6. Actions After the Attack

a. Decontamination. After an NBC attack, the primary concern is decontamination and treatment of casualties. Veterinary personnel will initiate organic personnel and equipment decontamination procedures.

b. Evacuation. Once an area is contaminated by an NBC agent, personnel may be evacuated from the area. If the area is evacuated, personnel and equipment should be decontaminated in accordance with prescribed guidance and assistance of supported unit or organic NBC decontamination teams. Responsible leaders ensure that the contaminated area is marked with NBC warning signs. The primary function of the veterinary unit while it is in the contaminated area is concentrated on protection and decontamination of organic personnel and equipment. When possible, the mission and duties of the contaminated unit/personnel may be transferred to other operational veterinary units/personnel by the commander.

c. Testing. Following an NBC attack, all subsistence within the boundaries of a contaminated area is considered contaminated and managed accordingly until testing determines which foods are safe for consumption. As a method of control, subsistence items located in contaminated storage facilities/areas are restricted from issue or use until necessary NBC testing can be completed. Access to subsistence storage facilities/areas will be restricted by the level of contamination.

d. Team Effort. In most instances, decontamination of subsistence does not begin until the surrounding area and storage facility are decontaminated. Technical guidance on food decontamination is provided to decontamination teams by veterinary personnel.

6-7. Decontamination Responsibilities

The question of whether subsistence should be decontaminated is decided by command authority. Technical advice is provided by veterinary personnel to assist in making this decision. The commander determines

how subsistence is provided to affected units and what actions, if any, are taken to decontaminate supplies. The commander and his staff coordinate priorities for large scale decontamination operations. In determining whether subsistence is to be decontaminated, the commander relies upon information and guidance provided by the veterinary personnel. Factors considered in determining the feasibility of subsistence decontamination include—

- Urgency of need.
- Priorities for other decontamination efforts.
- The tactical situation.
- Availability of other subsistence supplies for affected troops.

6-8. Subsistence Decontamination

There are three levels of decontamination for subsistence—individual, unit, and support. The level is dictated by who has control or responsibility for the item.

a. Individual Decontamination. The individual soldier performs this level of decontamination. Individual decontamination of subsistence is performed by each soldier on those subsistence items in his possession at the time of the attack. This is performed in conjunction with individual/equipment decontamination procedures as soon as possible after an NBC attack. Individual decontamination of subsistence is limited to operational rations that are in the original containers and still intact. The decision to decontaminate subsistence, however, rests with the individual's commander and not with the individual, except when the soldier is separated from his unit. The decontamination procedures are conducted as outlined in the unit SOP or as modified by the unit commander. At the individual level, the decontamination procedures are employed to the extent that the NBC hazard to the subsistence is reduced, thus allowing for continuation of the mission.

b. Unit Decontamination. Unit personnel under the supervision of NBC-trained personnel organic to the unit perform this level of decontamination. Decontamination procedures for subsistence items stocked by the unit are performed as soon as possible after an NBC attack and in conjunction with area decontamination procedures. Decontamination is attempted only on subsistence items that are in original, intact containers. Decontamination procedures are conducted by unit personnel in accordance with SOPs and supervised by unit NBC-trained personnel. Special decontamination requirements and/or advisability of decontamination efforts are relayed to unit commanders through command or medical channels, as required. The decontamination procedures employed are aimed at reducing or eliminating the NBC hazard presented by the subsistence.

c. Support Decontamination. Specially trained and specially equipped decontamination units/ teams accomplish this level of decontamination. The decision to decontaminate subsistence items at this level rests with the commander responsible for supplies. Support decontamination of subsistence is accomplished at major subsistence storage facilities/areas, such as the GS Class I activities in the theater.

At the support level, veterinary personnel advise on technical matters pertaining to the decontamination operations involving subsistence items. Veterinary personnel also monitor the decontamination results and recovery operations. They make recommendations if procedures need modification or correction and ensure that decontaminated subsistence is wholesome and suitable for issue. The support decontamination procedures must reduce the NBC hazard presented by subsistence to as low a level as possible.

6-9. Evaluation of Nuclear, Biological, and Chemical Hazards

a. Introduction. Commanders depend upon technical advice, professional guidance, and assessment of the situation provided by the veterinary personnel to determine the feasibility and advisability of conducting decontamination operations for subsistence.

b. Veterinary Assessment. The veterinary assessment of the situation is formulated using information and data from survey reports supplied by veterinary personnel conducting inspections of subsistence in contaminated areas. These veterinary survey reports are then consolidated with data received from other sources, such as NBC-monitoring teams, supporting laboratory, supply and PVNTMED units, and combat, technical, and medical intelligence. Veterinary personnel analyze the collected data to assess the status of the subsistence with emphasis on the following:

(1) Would consumption of the subsistence present an NBC hazard to personnel? The degree of risk is linked directly to the type of agent/contaminant and the level of residual contamination in the subsistence (see FM 8-10-7).

(2) The veterinary assessment requires that the NBC agent(s) be identified. The dissemination method of the agent also should be determined regarding the form of dispersion (liquid, solid, gas, aerosol, or fallout). The collected data should indicate degree of penetration of packaging and packing material by the contaminant.

(3) An analysis of the data obtained from veterinary surveys and information obtained from other sources aid in determining the most effective decontamination method. The practicality of a decontamination method is determined by many factors which must be considered in the analysis. Some of these factors are—

- The requirements for and the availability of personnel, equipment, and supplies needed for the decontamination operation. The proposed decontamination method selected should reduce the NBC hazard of subsistence sufficiently to permit human consumption.

- The method must not create additional hazards to the subsistence item or create additional risks for decontamination personnel.

- The method should be timely in regard to amount of subsistence that can be decontaminated.

- The method should provide a wholesome product suitable for its intended use.

(4) Once subsistence is decontaminated, the items may require special storage or handling procedures to protect them from deterioration or future exposure to NBC agents. An additional inspection must be conducted after decontamination to ensure subsistence decontamination was successful and that items are safe for consumption. Recoupment of the decontaminated items into clean packaging materials may be required for protection against future exposure to NBC agents. Some subsistence items may require upgraded protective storage in an enclosed facility with controlled temperature and/or relative humidity instead of storage in an open area protected by barrier covers. The decontamination process may materially reduce the storage life of the subsistence, thus requiring accelerated movement through the supply system. A determination is made as to type of precautionary markings required on subsistence containers. These precautionary markings aid personnel involved in the storage, issue, receipt, and preparation of the subsistence.

6-10. Veterinary Survey of Storage Facilities and Subsistence

a. Introduction. Surveys of NBC-contaminated subsistence and storage facilities/areas are conducted by veterinary personnel to obtain data for the veterinary assessment of the situation. The designated MOPP level must be adhered to while conducting the surveys. Veterinary personnel use available NBC-detection equipment for the survey. The survey is conducted, if possible, in conjunction with NBC detection or survey teams.

b. Survey of Storage Facility.

(1) A preliminary inspection is made to determine the effectiveness of the storage facility and other protective measures in preventing entrance of an NBC agent into the facility. An inspection of the structural integrity of the facility is made, checking for such damage as broken windows or holes in structure. The intactness of the facility is noted by the inspector. Other subsistence items will be closely monitored and tested, as needed. Chemical detection tapes are examined for indication of activation by chemical agents. The area surrounding the facility is examined for the presence of animals, rodents, birds, and insects acting unusual or whose death is unusual or unexplained.

(2) A survey of the storage facility is conducted using NBC alarms/detectors/monitors to determine the presence of an NBC agent. Detector paper, tape, and other detection equipment are used by the inspector to determine if an NBC agent or residue remains in the facility.

(3) Specimens are collected for submission to the supporting laboratory. Recorded symptoms of contaminated soldiers or animals, gross pathology, NBC equipment readings, and other observations are reported. This information, when combined with histopathology and other medical laboratory tests, aids in identifying the nature, level, and type of NBC agent.

c. Survey of Subsistence Items.

(1) A survey of subsistence items must be conducted to determine the presence of an NBC agent on or in the item and the extent of damage caused by the contamination. Veterinary personnel select for testing those subsistence items most likely to have been contaminated. These items will be located near entrances, ventilation inlets, and aisles.

(2) Packaging materials are tested for presence of NBC agents. The presence of unusual liquids or stains is noted. The degree of biological contamination, however, can only be determined by laboratory analysis. Results of the survey of packaging and packing materials are recorded. If an NBC agent is present, then this information is included in the survey.

d. Veterinary Nuclear, Biological, and Chemical Survey Findings. At the completion of the initial survey of the storage facility and subsistence, the findings are provided by veterinary personnel to the veterinary leaders. These findings will be as definitive and timely as possible. These survey findings must address the following points:

- Survey method and inspection procedures used to obtain data, to include type of detection equipment used. Data obtained from support units, such as medical laboratory/NBC units, should be included, noting the source of the data.

- Estimate of the quantity of food contaminated or suspected of being contaminated by the NBC agent. The quantity of contaminated subsistence is reported by the amounts in each of the following categories:

    - Operational rations.
    - B Ration components.
    - Semiperishable ration components.
    - Perishable items.
    - Medical B Rations.

- Recommendation as to advisability and feasibility of conducting a decontamination operation. The recommendation should include an estimate of the amount (percent) of contaminated subsistence that can be recovered if decontamination is accomplished.

e. Decontamination of Subsistence. Once it has been determined that subsistence is contaminated, commanders will decide if the subsistence will be decontaminated. Information provided by the survey aids the commander in reaching this decision. The responsible veterinary personnel provide technical information regarding the subsistence item/product packaging and packing characteristics, as required. See FMs 8-10-7 and 8-505 for additional information on the decontamination of subsistence items.

f. Disposition of Subsistence. The responsible veterinary officer has final approval for determining whether decontaminated subsistence is wholesome and is fit for human consumption. Subsistence supplies meeting wholesome standards should be identified and returned to a protective posture. Subsistence supplies not meeting the standards set for human consumption will be disposed of as directed by the senior veterinary authority.

Section II. TREATMENT OF MILITARY WORKING DOG CHEMICAL AGENT CASUALTIES

6-11. Chemical Agent Protection

The information in FM 8-285 on human casualties of chemical agents generally applies to all animals. Chemical protective doctrine for animals is not currently available, nor are animal protective masks any longer available through military supply channels. For these reasons, any degree of protection of the MWD in a chemical environment will, at best, be extremely difficult. The information given herein applies particularly to the MWD, although these principles can be applied to other animals.

6-12. Nerve Agents

a. Absorption. Nerve agents dispersed as a vapor, aerosol, or spray can be absorbed by the dog through the respiratory tract and the eyes. However, these agents have a limited absorption through the dog's skin because of the combination of the hair covering and the lack of sweat glands. The pads of the dog's paws will absorb nerve agents. In field concentrations, nerve agent vapors are absorbed extremely rapidly through the respiratory tract. (Liquid nerve agents are absorbed readily through the eyes, mucous membranes of the mouth and the nose, and gastrointestinal tract. The dog's respiratory tract, eyes, and paws are especially vulnerable to absorption of liquid agents.)

NOTE

The effectiveness of the Nerve Agent Pyridostigmine Pretreatment (NAPP) Tablet Set in dogs is not well documented. The use of NAPP in the MWD is a command decision. If NAPP is used, the MWDs should be identified as under the influence of the pyridostigmine prior to entering a potentially contaminated environment. A recommended NAPP regimen is ˝ tablet every 8 hours. All precautions regarding NAPP utilization as delineated in FM 8-285 should be followed in MWDs.

b. Protection. Protection for the dog's paws should be considered. There are indications that Mylar (polyethylene terephthalate) specimen bags may provide protection to the paws if the dog must cross through a contaminated area.

c. Effects on Food and Water. Liquid nerve agents or vapors of nerve agents can poison food and water. Animals should not be permitted to drink from water holes or trenches in contaminated areas, nor to drink surface water which has run off from contaminated areas. Water suspected of being contaminated should be tested by PVNTMED personnel and only that which is found to be safe should be

approved for consumption. Contaminated food or food that is suspected of being contaminated should NOT be fed to animals unless approved by veterinary personnel. Food and water packaged in sealed, airtight cans, bottles, or other impermeable containers can be decontaminated in accordance with provision of Appendix F, FM 8-10-7.

6-13. Signs of Nerve Agent Intoxication in Animals

a. All nerve agents generally produce similar effects, although the onset and severity of signs may vary depending upon the route and degree of exposure.

b. Exposure to nerve agent vapors produces local ocular and respiratory effects before other effects. These signs usually appear within 5 minutes after exposure. The initial ocular effect is pupillary constriction. Respiratory exposure is manifested by a rapid, panting respiration and an increase in upper respiratory secretions resulting in watery nasal discharge. Increased upper respiratory secretions, with bronchoconstriction which may occur shortly afterward, will cause coughing, rattling sounds in the throat, wheezing, and respiratory distress. More severe exposures may cause eye pain and visual impairment.

c. Systemic absorption of enough nerve agent through the respiratory tract or gastrointestinal system will increase the severity of local effects and also will cause generalized systemic effects. Respiratory distress becomes marked due to profuse bronchial secretions, bronchoconstriction, and airway obstruction. The distressed animal will gasp and the mucous membranes of the mouth will become blue (cyanotic) as a result of decreased oxygenation. Other effects which may occur are slowing heart rate, profuse salivation and frothing, loss of fecal and urinary control, and increased peristalsis and abdominal pain. Muscular effects occur with other systemic effects and the animal will exhibit muscular weakness, twitching muscles, and trembling. As weakness and paralysis of respiratory muscles progress, breathing becomes increasingly labored, shallow, rapid, and finally intermittent, with the animal quickly becoming oxygen-deficient. In severe exposures, the onset and progression of signs are very rapid. The animal may tremble violently, become uncoordinated, collapse, and go into generalized convulsive seizures. Loss of consciousness may ensue with a total loss of reflexes. Convulsions may become intermittent, with the animal showing a rapid panting respiration between convulsive episodes. Marked generalized convulsions are usually followed by complete flaccid paralysis, central respiratory and circulatory depression, asphyxiation, and death.

d. The symptoms of cutaneous exposure to liquid nerve agents are similar to respiratory exposure to nerve agent vapors. A difference is that the initial signs take longer to develop and the transition from mild to severe symptoms may be slower. With fatal cases, the survival period may be hours, whereas in the inhalation poisoning most deaths occurred in a few minutes. Cutaneous exposure causes local twitching at site of contamination, increased gastrointestinal activity, salivation, miosis, generalized tremors, prostration, and convulsions. Dyspnea is not a pronounced symptom of early cutaneous poisoning, which differs from the inhalation route. Hypopnea occurs during the prolonged convulsive phase. A lethal factor in cutaneous poisoning is the rapid and very considerable rise in body temperature to heatstroke levels caused by the prolonged convulsions.

6-14. Nerve Agent Decontamination Procedures

Following contamination of the hair coat, skin, or eyes, the animal should be decontaminated as quickly as possible to prevent or reduce any further absorption of the agent.

CAUTION

All persons who handle animals contaminated with nerve agents must be in MOPP 4.

a. Hair and Skin.

(1) Since the hair coat delays penetration of liquid agents to the skin and cutaneous absorption requires several minutes, effective decontamination of the hair and skin may be carried out before any significant absorption has occurred. Decontamination is not a substitute for treatment. When the animal shows signs of exposure to a nerve agent, specific therapy should be initiated.

(2) The entire animal (except eyes) may be decontaminated by using the M291 Skin Decontaminating Kit or scrubbing the hair coat and the skin with a 5 percent solution of sodium carbonate (50 grams [g]/liter). It is important for the decontaminating solution to penetrate the hair coat and to reach the skin. Then the hair coat and the skin should be rinsed with warm water, scrubbed with warm soapy water, and rinsed again. While this is being done, the decontaminating solution must be kept out of the animal's eyes. A generous amount of nonmedicated ointment (such as petroleum jelly) should be applied over the eyes before using the decontaminating solution near the eyes.

(3) Small, localized areas of liquid contamination on the animal's hair, skin, collar, or leash may be removed by washing with a 5 percent sodium carbonate solution.

CAUTION

Do not use sodium carbonate for a VX (nerve agent). It cannot detoxify VX and creates extremely toxic by-products (see Table F-2, FM 3-5).

b. Eyes. Any amount of liquid nerve agent getting into the eyes of an animal requires prompt action to prevent conjunctival absorption, which can occur very rapidly. The eyes can be decontaminated by irrigation with copious amounts of water until all agents have been removed. Avoid using any components from the M291 Skin Decontaminating Kit in the eyes.

NOTE

The M291 Skin Decontaminating Kit is replacing the M258A1 Skin Decontamination Kit. The dog handler carries an additional M291 Skin Decontaminating Kit for his dog.

6-15. Treatment of Animal Casualties of Nerve Agents

a. Emergency Therapy Procedures.

(1) Initial first aid includes administering one Nerve Agent Antidote Kit, MARK I (carried by the dog handler), into the back of the thigh of the dog. In the severely poisoned dog (paragraph 6-13*c*), administer three sets of the MARK I in rapid succession with one injection of the convulsant antidote for nerve agent (CANA).

NOTE

The dosage for atropine in nerve agent poisoning in the dog is 0.2 to 0.4 milligram (mg)/kilogram (kg). For an average-size MWD (40 kg), 8—16 mg (4—8 MARK I atropine injectors) may be required for initial control of clinical signs. The CANA is an autoinjector containing 10 mg of diazepam. It is used to prevent and control convulsions.

Single atropine injections of 2 mg are continued every 10 to 20 minutes until the nerve agent effects have subsided or signs of atropinization appear—see paragraph (6) below.

NOTE

It should be noted that not all clinical signs of nerve agent intoxication can be alleviated with atropine. Care should be taken to ensure that atropine intoxication is not induced.

It should be noted that the above treatment is the same as that administered to the soldier. The MWD must be monitored for heat stress. The atropine dries the mucous membranes, thus preventing the MWD from expelling body heat.

(2) The initial dosage of 2 PAM Cl (pralidoxime chloride) in the dog is 20 mg/kg. Two 2 PAM Cl injectors should be sufficient. Additional 2 PAM Cl may need to be administered, but not at the same rate as atropine. If after 1 to 2 hours no significant improvement has been noted, an additional injector of 2 PAM Cl should be given.

NOTE

The initial dosage of 2 PAM Cl in the dog is 20 mg/kg. Two 2 PAM Cl injectors should be sufficient.

However, it is not likely that more than two 2 PAM Cl injectors will be needed.

(3) Maintain a clear airway. Remove respiratory secretions and saliva obstructing the airway.

(4) In severe nerve agent exposure, the animal's respiration is markedly depressed and extreme muscular weakness or paralysis is present. In such cases, assisted ventilation is required to effectively resuscitate the animal.

(5) Adequate atropine and 2 PAM Cl should bring about an improvement or restoration of spontaneous respiration and also improve blood circulation. However, the effectiveness of 2 PAM Cl after a short period of time is lost. The 2 PAM Cl varies in its effectiveness against nerve agents. It is least effective against Soman (GD).

(6) Signs of effective atropinization include dry mouth and mucous membranes, increased heart rate, and increased body temperature. Atropine administered systemically may not overcome local ocular effects so that the absence of pupillary dilatation does not necessarily indicate the need for further atropine administration. Canine nerve agent casualties can tolerate much greater doses of atropine than would a normal dog that has not been exposed to a nerve agent. However, repeated doses of atropine will markedly increase its effects, especially in animals that have received only a minimal exposure.

b. Supportive Therapy Procedures.

(1) Maintain a clear, unobstructed airway. Assisted ventilation may be required.

(2) Complete decontamination, if not already performed.

(3) Provide supportive treatment, as indicated.

(4) As previously stated, atropine is usually sufficient to control central nervous system (CNS) signs, but if convulsions persist or occur intermittently and further interfere with respiration, they may be controlled by the administration of CANA intramuscularly.

6-16. Incapacitating Agents (BZ Type)

a. Absorption and Protection. Significant absorption of BZ is most likely to occur through the animal's respiratory tract, but effective percutaneous and gastrointestinal absorption can occur. The protective measures for nerve agent poisoning can be applied to incapacitating agents.

b. Signs of Intoxication.

(1) BZ is an anticholinergic agent with pharmacological effects similar to those of atropine, although it has a greater effect on the CNS than atropine. The onset of signs following a moderate respiratory exposure can be expected to occur within 10 to 20 minutes. In general, the greater the dose, the shorter the time for the onset of symptoms.

(2) In the MWD, early effects of moderate exposures to BZ include increased heart rate, pupillary dilation, impaired vision, dry mouth, and a decrease in physical endurance while working. Marked rises in body temperature do not usually occur. The agent's predominant effects are on the CNS, resulting in incoordination, behavioral changes, confusion, and a lack of normal responses to commands. These exposures can be expected to incapacitate animals and make them unfit for service.

(3) There is a large margin of safety between incapacitating and lethal exposures to BZ. Overwhelming exposures, however, can result in prostration and convulsions, with death occurring rapidly.

c. Treatment.

(1) After an animal has had a moderate exposure to BZ, effects may persist 24 hours or more. Although the animal's life is not immediately threatened, therapy can be administered to hasten recovery and return the animal to duty as quickly as possible. However, the animal should be examined and its disposition determined before it is returned to duty.

(2) General therapy for BZ exposure should include decontaminating the hair and the skin with warm soapy water, restricting activity, and keeping drinking water available.

(3) Physostigmine salicylate (0.1 to 0.6 mg/kg) is given by slow intravenous (IV) or intramuscular (IM) injections. Repeated doses of physostigmine can be given at intervals of 1 to 2 hours if signs of BZ exposure persist or recur. Continuous therapy may not be necessary since the effects of the exposure gradually disappear. If continuous administration is required, it should be carried out at reduced dosage levels to avoid an overdose of physostigmine. The signs of physostigmine overdose include pupillary constriction, muscle weakness, twitching, vomiting, diarrhea, respiratory distress, slowed heart rate, and convulsions. If toxicity is noted, further administration of physostigmine should be discontinued and one atropine injector should be given intramuscularly to control severe effects of overdose.

(4) Anesthetics, tranquilizers, and sedatives tend to potentiate the effects of incapacitating agents and are contraindicated in the treatment of animals exposed to BZ.

6-17. Blister Agents

The terms blister agent or vesicant are misnomers when applied to animals since vesiculation occurs in only a few species, although these agents do injure any part of the body they contact. The preventive measures used for nerve agents can also be used for blister agents. If a dog must walk through a contaminated area, its paws should be protected to prevent the blister agent from reaching the skin (paragraph 6-12*b*).

The effects of specific blister agents and their treatment and decontamination procedures are described in paragraphs 6-18 through 6-20 below.

6-18. Mustard

a. Effects.

(1) Liquid mustard or mustard vapors produce delayed effects on the skin and eyes following exposure. The long hair of dogs does not prevent injury to the skin, but it does impede the penetration of liquids and vapors to the skin.

(2) Contamination of the skin is followed by a latent period, which varies in length with the degree of exposure. Within 1 hour after exposure, piloerection (erection of the hair) occurs at the site of exposure and may last for an hour or more. Two to three hours after that, redness and edema of the skin develop, increasing in intensity for 24 hours and then subsiding. In mild exposures, edema is followed by exfoliation of the epidermis of the skin. Severe exposures form ulcerated lesions. The lesions heal satisfactorily unless they become secondarily infected.

(3) The eye is most sensitive to mustard's corrosive effects. Liquid mustard or heavy vapor exposures can be extremely damaging to the entire eye. Mild ocular exposures are followed by conjunctivitis and conjunctival edema (usually appearing within 1 or 2 hours), edema of the eyelids, corneal opacity and inflammation of the cornea; corneal roughening, and pain. More severe exposures can produce more serious lesions, resulting in necrotic conjunctivitis, corneal erosions or deep ulcerations, deep ophthalmic inflammation, and permanent corneal opacification due to scarring. These lesions predispose the eye to secondary bacterial infections.

(4) Mild to severe exposures to mustard vapor damage the respiratory tract. Inhalation of blister agent vapors will first produce sloughing and ulceration of the tracheobronchial mucosa. Profuse inflammatory exudation and edema may cause respiratory distress. More severe exposures produce involvement of the lung tissue, pulmonary edema, and acute pulmonary alveolar emphysema, and may become complicated by secondary purulent bronchopneumonia. The effects of respiratory exposures tend to develop over several days. The signs of respiratory involvement include cough, nasal discharge, respiratory difficulty, fever, and tracheal and pulmonary rales.

(5) Ingestion of contaminated food and water or the licking of contaminated parts may produce ulceration of the alimentary mucous membranes, resulting in oral ulceration, abdominal pain, vomiting, bloody diarrhea, and prostration.

(6) Systemic absorption of mustard can result from extremely high skin or respiratory exposures, or from absorption of the agent from the intestines. It may produce systemic effects involving the CNS, cardiovascular system, and hematopoietic system. The possibility of severe leukopenia and susceptibility to infection also exists. These effects are manifested by excitation, salivation, slowed heart rate, decreased count of white blood cells and platelets, bloody diarrhea, and shock.

b. Decontamination.

(1) All persons who receive and handle contaminated animals must be in MOPP 4.

(2) Because of the insidious action of mustard vesicants (where effects are not immediately apparent) or the rapid action of arsenical vesicants, decontamination will not be entirely effective. Yet, it is essential to decontaminate animals promptly after exposure to prevent more serious injuries and to mitigate the effects of exposure where possible. Decontamination should be carried out within the first minute or two after contamination with vesicants to prevent injury and BEFORE treatment is begun. Decontamination should be accomplished as soon as possible to prevent contamination of handlers and treatment area.

(3) Before redness and edema appear, localized areas of the skin can be decontaminated by using the M291 Skin Decontaminating Kit as described in FM 8-285. Where mustard vesicants were used, decontamination of a large portion of an animal's body can be done by applying dressings soaked with a 0.5 percent chlorine solution (calcium or sodium hypochlorite solution). Collars, muzzles, and leashes are also decontaminated by using the M295 Decontamination Packet, Individual Equipment, or an M291 kit.

c. Treatment. The treatment for either local or systemic effects of mustard blister agents is primarily symptomatic and similar to the treatment described in FM 8-285 for human casualties. Specific systemic and/or topical antibiotic therapy should be administered when indicated. Supportive therapy may be required to maintain the animal's nutritive and fluid status. With eye injuries, the degree of corneal damage should be determined with fluorescein stain and treated accordingly. Also, the possibility of leukopenia, lung damage, sepsis, or other injuries may exist.

6-19. Arsenical Blister Agents

a. Effects. Arsenical blister agents are more damaging as liquids than as vapors. Exposure to liquid arsenical blister agents is immediately painful, and the exposed animal becomes very restless. Lesions produced by these agents are more severe and develop faster than those produced by mustard. Liquid arsenicals on the skin and their inhaled vapors are readily absorbed into the systemic circulation, producing signs of arsenic poisoning manifested by restlessness, vomiting, bloody diarrhea, shock, weakness, anemia, and pulmonary edema.

b. Decontamination. Procedures for decontamination are the same as those applied for mustard (paragraph 6-18*b*).

c. Treatment.

(1) The treatment of lesions induced by arsenical blister agents is similar to that for other blister agents. To treat localized skin exposures, British anti-lewisite (BAL) ointment can be rubbed into the contaminated areas, allowed to remain 5 minutes, and then washed off. Any other protective ointment on the skin must be removed before application of BAL ointment. When BAL ointment is applied, it will penetrate and neutralize arsenical blister agents.

(2) Systemic treatment for arsenical blister agents is indicated when there is extensive skin exposure which has not been decontaminated within 15 minutes, when a very rapid onset of effects follows exposure, or when systemic signs of arsenic poisoning appear. Systemic therapy consists of the administration of BAL at 2.5 to 5.0 mg per kg by IM injection. Dosage can be repeated every 4 hours for 2 days and then two times per day for the next 10 days or until recovery is apparent. Supportive therapy also should be administered as indicated.

6-20. Nitrogen Mustards

Liquid and vapor exposures to nitrogen mustards are less damaging to the skin of animals than are equal concentrations of mustard or arsenical blister agents. Exposures of the eye to nitrogen mustard, however, produce more serious lesions than mustard exposures. The respiratory, gastrointestinal, and systemic effects of nitrogen mustard are similar to those caused by mustard. Decontamination and therapy for nitrogen mustard are similar to those for mustard.

6-21. Phosgene

The effects of phosgene (CG) in animals are similar to its effects in humans. One difference is that cyanosis (which is so prominent in human casualties of CG) is masked in animals. For exposed animals, extreme exertion is dangerous, especially when pulmonary edema develops. Animals in shock should be kept comfortably warm and given oxygen, if available. If pneumonia develops, treatment with antibiotics is indicated.

6-22. Irritant Agents

Under field conditions, the irritant agents bromobenzylcyanide (CA), chloroacetophenone (CN), and O-chlorobenzylidene malononitrile (CS) have little effect on animals. The CS agent may cause increased respiration and hyperactivity. Liquid or solid agents in direct contact with the eyes will cause severe irritation; the eyes should, therefore, be flushed with saline or water. For skin decontamination, a 0.25 percent solution of sodium sulfite is more effective than saline or water in dissolving and neutralizing the irritant agent and should be used if it is available.

6-23. Smokes

a. White Phosphorus (WP). Burning particles of WP cause deep burns on contact with the skin. The smoke is generally not toxic. Since WP burns spontaneously when exposed to air, oxygen must be excluded to stop the burning. This may be done by submerging the burn or wound in water or by covering it with a water-soaked dressing. At the earliest opportunity, all WP should be removed from the skin as follows: Bathe the affected part in a bicarbonate solution to neutralize phosphoric acid, which then allows removal of visible WP. Remaining fragments will be observed in dark surroundings as luminescent spots. If the animal's condition will permit, the burn should be debrided promptly to remove bits of phosphorus

which might be absorbed later and possibly produce systemic poisoning. An ointment with an oily base should not be applied until it is certain that all phosphorus has been removed. Further treatment should be carried out as for thermal burns. Treatment with ultraviolet light is both palliative and therapeutic. If the eyes are affected, treatment should initially be commenced by irrigation, using water or saline. The lids must be separated and a local anesthetic instilled to aid in the removal of all imbedded particles. In eyes with severe ulceration, atropine sulfate ophthalmic ointment should be instilled once all particles have been removed.

b. Sulfur-Trioxide Chlorosulfonic Acid Solution (FS), Titanium Tetrachloride (FM), and a Chemical Mixture (HC). Field concentrations of these agents usually are not harmful to animals, but the liquid may cause burns on the skin and in the eyes. After the eyes are irrigated, they are treated the same as for thermal burns.

6-24. Blood Agents (Systemic Poisons)

a. General. These agents produce toxic effects after absorption. Inhalation is the usual route of entry. Hydrogen cyanide (AC) and cyanogen chloride (CK) are the important blood agents.

b. Effects and Treatment.

(1) Hydrogen cyanide causes asphyxiation of the tissues, especially the respiratory center of the CNS. In addition to cyanide effects, CK causes marked local irritant effects on the respiratory system which lead to pulmonary edema.

(2) Treatment is difficult under field conditions. It should consist of oxygen therapy under positive pressure ventilation and one 10-milliliter (ml) (3 percent) ampule containing 300 mg of sodium nitrite followed by one 50-ml (25 percent) ampule containing 12.5 g of sodium thiosulfate intravenously. The IV administration of one ampule of sodium nitrite followed by the IV administration of one ampule of sodium thiosulfate immediately after exposure to cyanide should be lifesaving in the dog.

NOTE

The dosage of sodium nitrite is 16 mg/kg or 640 mg, intravenously, for a 40 kg dog, followed immediately by sodium thiosulfate at a dose rate of 30 mg/kg. If additional treatment is required, use only sodium thiosulfate since there should be sufficient methemoglobin present from the original dose of sodium nitrite.

6-25. Biological Agents

a. Disease produced by the offensive use of biological agents against US forces could be lethal and/or disabling. These biological agents could also infect the animal population within the contaminated area.

b. The veterinary medical response to the threat or use of biological weapons may be different depending on whether veterinary medical measures are employed prior to exposure, or whether exposure has already occurred and/or symptoms are present. If provided before exposure, active immunization or prophylaxis with antibiotics may prevent illness in those government-owned animals which are exposed. Active immunization may be effective against several potential biological warfare agents, the best modality for future protection against a wide variety of biological threats. After exposure, active or passive immunization, as well as pretreatment with therapeutic antibiotics or antiviral drugs, may ameliorate disease symptoms. After the onset of illness, only diagnosis of the causative agent and general or specific treatment are left to the veterinary care providers.

6-26. Nuclear Weapons

a. A proliferation of NBC capabilities beyond the lines of the major powers has increased the likelihood of NBC use in a conflict. The number of Third World countries seeking the technology for nuclear weapons and advanced surface-to-surface missiles has increased. Many Third World or developing nations have current or near-term access to the materiel needed to produce nuclear weapons. With current trends in nuclear proliferation, the nuclear threat now and in the future will be global. The proliferation of nuclear-capable nations in all contingency regions increases the likelihood of US forces being targets of nuclear attack.

b. If US forces are attacked with nuclear weapons, government-owned animals will present the same types of medical problems as seen with human patients. These medical problems will include blast, thermal, and radiation injuries and radiation sickness depending on the amount of radiation received. Veterinary care will be based upon the clinical condition of the animal and its prognosis for recovery. For definitive information on the medical effects of nuclear weapons, diagnosis, treatment, and prognosis, see FM 8-9.